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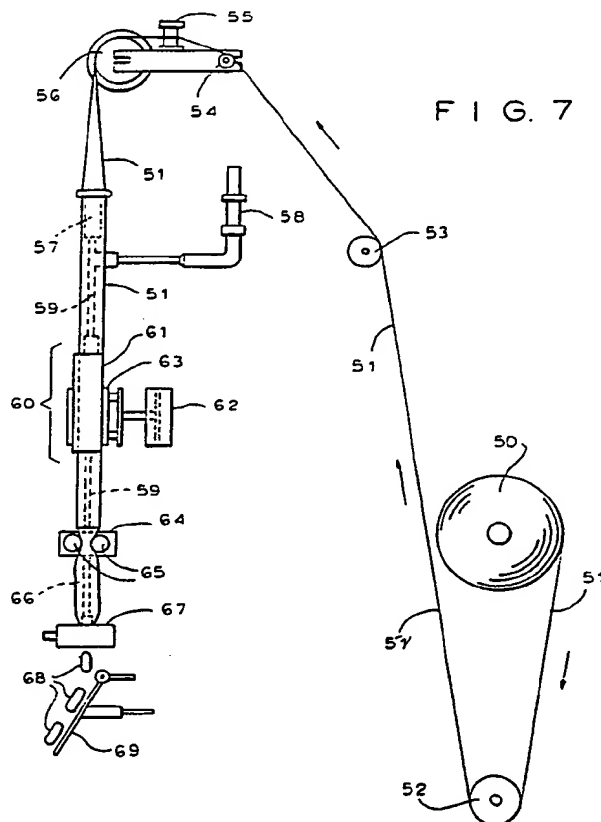
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(54) Ultrasonic welding in pouch manufacturing

(57) Pouch containers which are sealed by ultrasonic welding can be severed one from the other using the ultrasonic sealing unit to sever the film after sealing the film. This can be done by the energy director on the ultrasonic horn having sidewalls of a given angle and by increasing the pressure of the ultrasonic horn against the anvil.



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FIG. 2

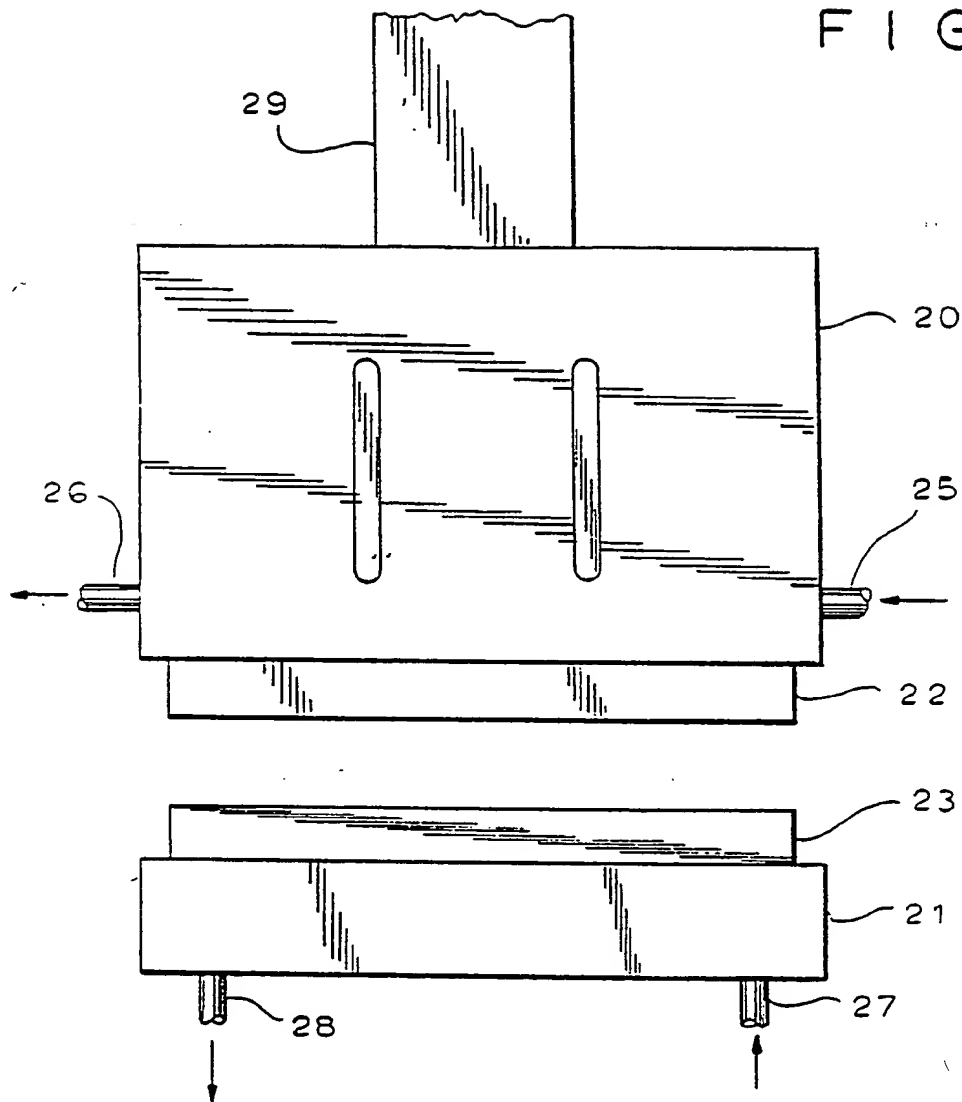
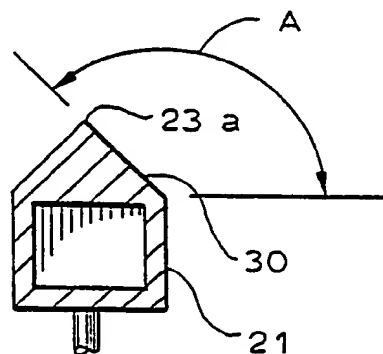


FIG. 3



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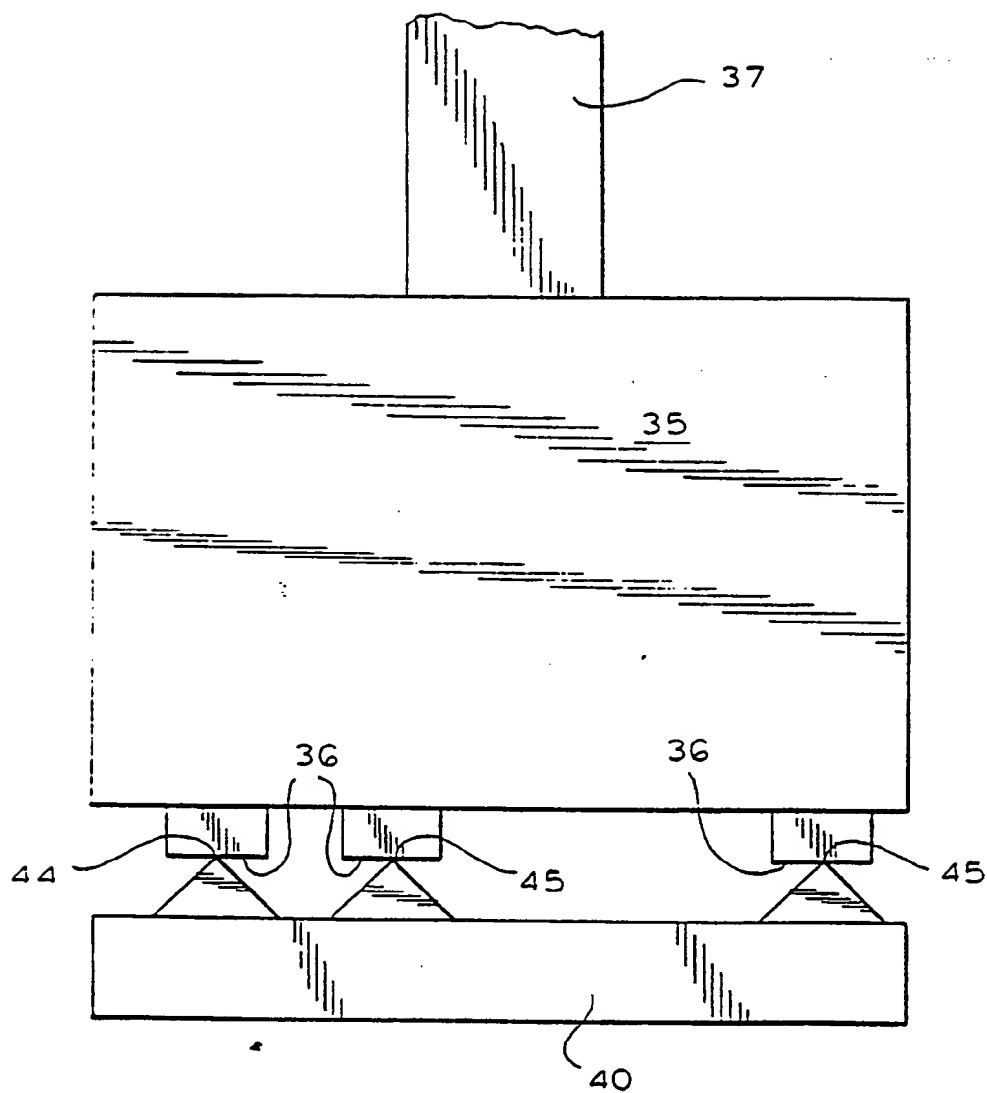


FIG. 6

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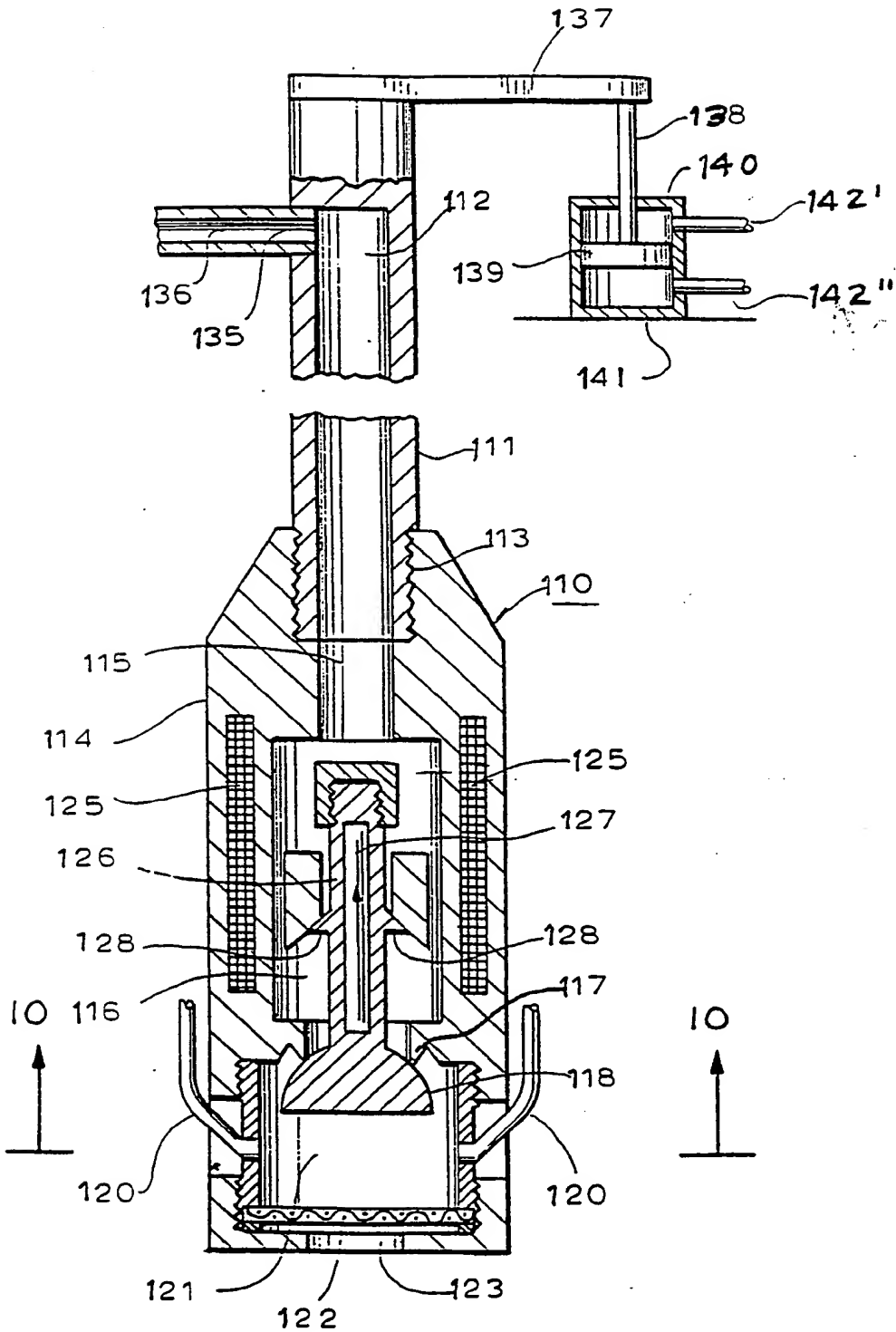


FIG. 8

FIG. 10

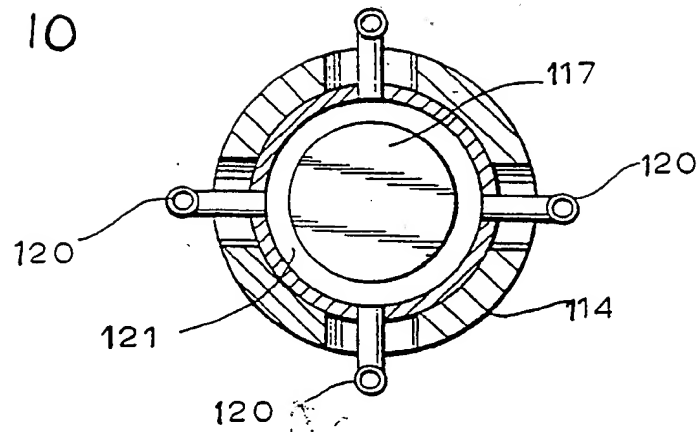


FIG. 11

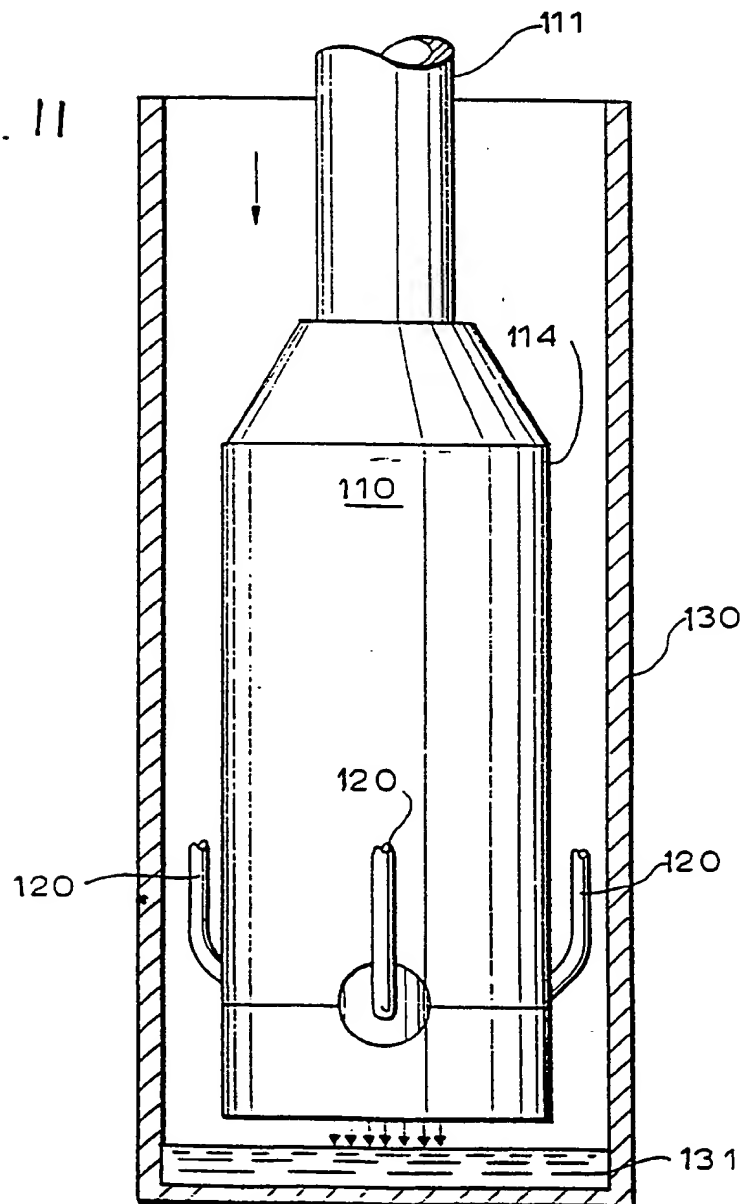
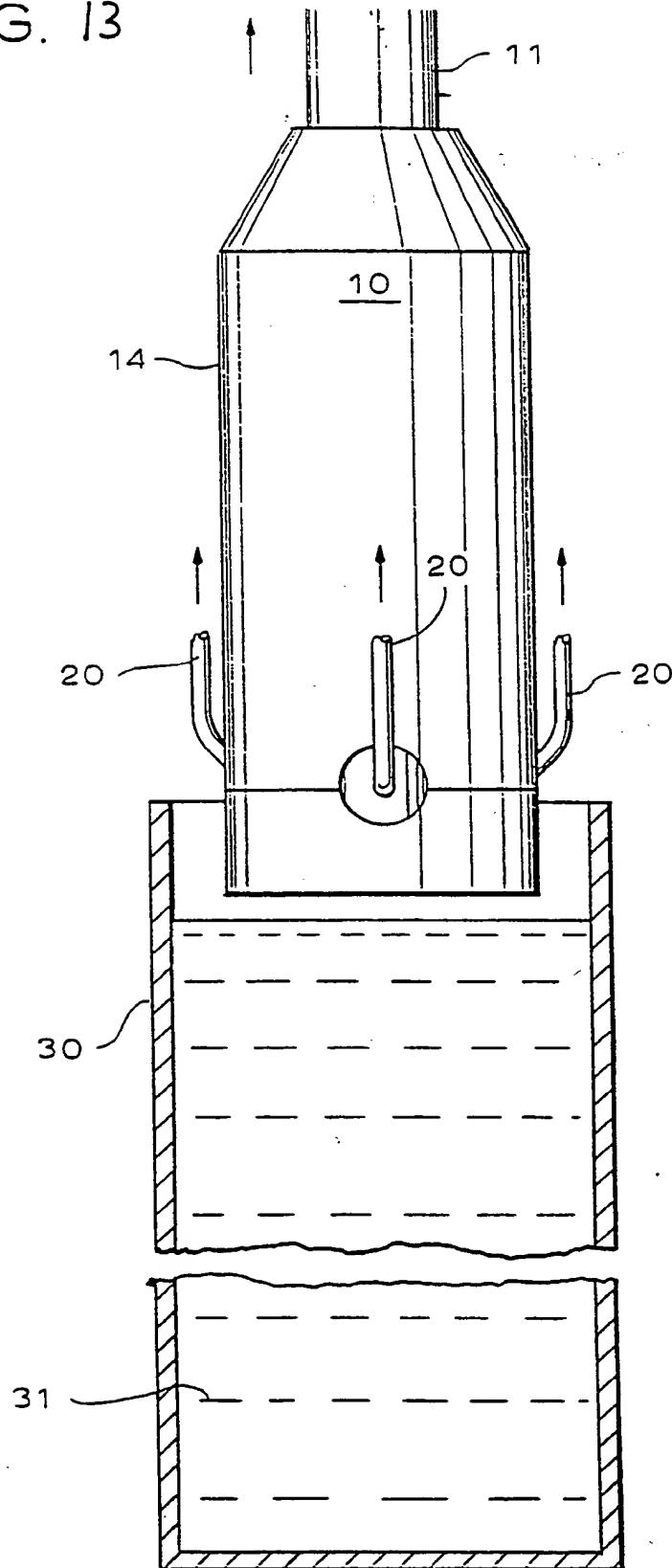


FIG. 13



1 thickness of the film is heated rather than the film
2 surface. This provides good sealing but is restricted
3 to films that absorb a sufficient amount of RF energy
4 to soften. Also, since the full thickness of the film
5 is heated, there is the potential for overheating the
6 film and depositing pieces of film, known as flash,
7 onto the electrodes. This will affect subsequent seals
8 made by the electrodes until they are cleaned.

9 It has been found that the use of ultrasonic
10 sealing for forming pouches from thermoplastic films is
11 an improvement over the use of adhesives, heated
12 platens or RF energy. In ultrasonic sealing, only the
13 surfaces that are to be bonded are heated. They are
14 heated by absorbing impact energy. The full thickness
15 of the film is not heated. This provides for various
16 advantages. Films that do not have a sufficiently high
17 absorption for RF energy can be used to make the
18 pouches. The problem of flash formation is also
19 obviated. Due to the heat being formed only at the
20 impact surfaces, flash will not be produced.

21 It has also been found that the use of ultrasonic
22 sealing has distinct advantages in form/fill
23 operations. These are operations where the pouch is
24 filled as it is formed. A problem with form/fill
25 operations for pouches is that during the filling
26 sequence, there is a tendency for the product to
27 contact the area of the pouch that is to be sealed. In
28 other types of sealing, including RF sealing, this can
29 produce weakened seals. However, in ultrasonic sealing
30 there is a cleaning of the surfaces that are to be
31 bonded prior to bonding. This is accomplished by
32 surface to surface vibration. Consequently, it has

1 It has been found to be advantageous in forming
2 and filling thermoplastic pouches to use ultrasonic
3 sealing techniques in forming the pouches. Ultrasonic
4 sealing has advantages over the use of adhesives,
5 conduction heating or dielectric heating. A distinct
6 advantage is the ability to simultaneously clean the
7 surface of the film that is to be a part of the seal
8 while heating this surface to at least its melting
9 point. This is important in form/fill sequences where
10 the pouch will be formed and filled in the same
11 sequence. In such packaging operations, the substance
12 being packaged, usually a liquid, will contaminate some
13 of the seal area when it is flowed into the open pouch.
14 In order to get a good seal, this area should be clean.
15 This can be accomplished in various ways. However, the
16 most efficient way is to use ultrasonic sealing
17 techniques. In this way, the sealed area will be
18 cleaned as it is being sealed.

19 Also a part of the present invention is the use of
20 an ultrasonic sealing unit which is comprised of an
21 ultrasonic horn and an anvil for the dual purpose of
22 sealing a film and cutting a film. This is
23 accomplished by the same surfaces on the ultrasonic
24 horn and anvil. The shaped cutting surface will,
25 preferably be a part of the anvil and will desirably be
26 of a triangular cross-sectional shape. The outside
27 base angles of the triangle will be about 120° to 160° .
28 This will provide for 20° to 60° interior angles. The
29 top of the shape terminates in a smooth edge.

30 Further, the pouch containers which are sealed by
31 ultrasonic welding can be severed one from the other
32 using the ultrasonic sealing units to sever the film

1 partially formed pouch with the said liquid substance,
2 closing the said pouch by sealing the opening through
3 which the pouch has been filled using ultrasonic energy
4 applied by an ultrasonic horn to an anvil at a first
5 contact pressure, and increasing the contact pressure
6 to sever the film.

7 Preferably the method comprises:

8
9 (a) shaping a flexible film into a tubular shape
10 with an overlapping edge;

11
12 (b) contacting the overlapping edge of the said
13 film in a tubular shape with ultrasonic
14 energy to bond the overlapping edge of the
15 said tubular shape to form a tube;
16

17 (c) sealing by ultrasonic energy a lower portion
18 of the said tube to form a first pouch;
19

20 (d) filling the said first pouch with a
21 substance; and
22

23 (e) sealing by ultrasonic energy (I) an upper
24 portion of the said first pouch to seal the
25 said pouch, and (II) another portion,
26 (upstream of the first pouch) of the said
27 tube to form a second pouch, and severing the
28 said first pouch from the said second pouch.
29

30 Preferably a die shapes the said film into a
31 tubular shape having an overlap of about 0.1cm to about
32 1.0 cm.

1 In the sealing of the top seal to form a pouch and
2 a beak spout adjacent to the top seal, the excess film
3 in the area of the beak spout may be severed in a
4 second step.

5 The invention in another aspect extends to a
6 shaped sealed flexible film pouch containing a liquid
7 substance, the pouch being comprised of one or more
8 plies, having a side seam, a lower seam, an upper seam,
9 and a spout, all sealed through the use of ultrasonic
10 energy.

11 The said spout is preferably at the upper edge of
12 the said pouch and preferably is in the form of a beak.

13 The invention further extends to an apparatus for
14 forming and filling pouches comprising:

15

16 (a) means to shape a flexible film into a tube
17 having an overlapping longitudinal seam;

18

19 (b) a first ultrasonic horn and anvil assembly;

20

21 (c) means to position the overlapping
22 longitudinal seam of the said flexible film
23 between the said first ultrasonic horn and
24 anvil;

25

26 (d) means to actuate the said first ultrasonic
27 horn and anvil assembly to seal the said
28 overlapping seam to form a tube;

29

30

31

32

1 The apparatus preferably comprises means to
2 produce a pressure of about 10 kg/cm² to 70 kg/cm²
3 between said second ultrasonic horn and anvil during
4 sealing and a pressure of about 20 kg/cm² to 100 kg/cm²
5 during severing.

6 The invention also extends to an ultrasonic horn
7 and anvil assembly for sealing and severing
8 thermoplastic film comprising a shaped contact surface
9 on one of the said ultrasonic horn or anvil adapted to
10 seal the said film upon the application of a first
11 pressure and ultrasonic energy and to sever the said
12 film upon the application of a second higher pressure.

13 The said shaped contact surface is preferably
14 essentially triangular in cross-section with the base
15 exterior angle being about 120° to 160°.

16 The second aspect of the invention addresses a
17 further problem and relates to a method and apparatus
18 for filling packages, such as pouches, with liquids and
19 preventing splashing of the filling substance. In
20 particular, this aspect of the invention relates to a
21 nozzle which includes means to prevent excess liquid
22 from flowing into the pouch or bottle and means to
23 maintain the exit of the nozzle above the level of the
24 liquid in the pouch or bottle during filling, and the
25 method of using this valve to fill pouches and bottles.

26 Many problems are met in the filling of pouch
27 containers. One of these problems is the splashing of
28 the liquid as it is being filled into the container.
29 Another problem is dripping from the nozzle after the
30 container has been filled. Such splashing and dripping
31 will result in contamination of the seal area of the
32 container. Excessive splashing can also result in the

1 excess liquid from the screen area. In addition, the
2 entire elongated tubular member which comprises the
3 nozzle can be moved upwardly as a container is being
4 filled in order to maintain the exit end of the nozzle
5 at a set distance above the level of the liquid in the
6 container and thus minimise the impact energy of the
7 liquid as it enters the package.

8 According to this aspect of the present invention
9 an anti drip nozzle for filling containers e.g.
10 flexible film packages comprises an elongated tubular
11 member having an aperture therethrough for the flow of
12 a liquid, means at an upper end for the introduction of
13 a liquid and an outlet aperture provided with at least
14 one screen means across the aperture, and suction means
15 adapted to remove liquid from the said screen, and
16 preferably means adapted to cause the said tubular
17 member to be raised during the filling of the
18 container.

19 According to this aspect of the invention a method
20 of filling a container e.g. a flexible film package or
21 pouch with a liquid comprises :

22
23 (a) providing a tubular nozzle having a channel
24 therethrough, means at one end of the said
25 channel to attach the said valve to a source
26 of a liquid, and suction means on the other
27 end to prevent dripping upon the cessation of
28 input of liquid to the said tubular nozzle;
29
30
31
32

1 ceases and by means of suction excess liquid in the
2 region of the one or more screens of the nozzle is
3 removed by means of the suction. This reduces drip
4 formation upon the cessation of the flow of liquid.

5 As the container is being filled, the valve
6 desirably moved upwardly so as to be a set distance
7 above the level of the contents of the container during
8 filling. In addition, the liquid passes through an
9 anti-splash screen as it exits the valve. In a further
10 feature, associated with the screen are one or more
11 suction units which operate at the cessation of liquid
12 flow from the valve to remove liquid from the screen
13 and prevent dripping. The combination of the valve
14 moving upwardly during container filling, a screen, and
15 suction units associated with the screen function to
16 prevent splashing during filling and dripping after
17 filling.

18 The invention may be put into practice in various
19 ways and one specific embodiment and a number of
20 modifications will be described by way of example to
21 illustrate the invention with reference to the
22 accompanying drawings in which:

23
24 Figure 1 is a rear elevational view of a pouch
25 with a beak spout formed using ultrasonic techniques;
26

27 Figure 2 is an elevational view of a sealing unit
28 for sealing the longitudinal seam of the pouch of
29 Figure 1;
30

31 Figure 3 is a cross-sectional view of an anvil for
32 sealing and severing a film;

1 Figure 13 is an elevational view of the fill
2 nozzle of Figure 8 with the container having been
3 filled.

4
5 The process of the first aspect of the invention
6 will be described with reference to the manufacture of
7 pouches having spouts, as shown in Figures 1 to 7. An
8 illustrative pouch is set forth in Figure 1. This
9 pouch is designated 10 and has a rear surface, 11, a
10 longitudinal seal 12, a bottom seal 13 and a top seal
11 14. There is also a beak spout 15 with a cut-out 17
12 and an associated seal 16.

13 In the process of forming and filling the pouches
14 of Figure 1, a film is in a first step formed into a
15 tube which is accomplished by each edge of the film
16 being overlapped from about 0.1 to 1.0 cm to form a
17 seam. This seam is passed between the ultrasonic horn
18 and an anvil of a longitudinal ultrasonic sealing unit.
19 Since the seam is now between the ultrasonic horn and
20 the anvil upon the application of pressure and
21 ultrasonic energy to the ultrasonic horn and/or anvil
22 the thermoplastic material at the seam juncture is
23 heated and bonded. Pressure is preferably applied to
24 the ultrasonic horn. After this step, the film is now
25 in the shape of a tube. Preferably, at the same time
26 that the side seam is being sealed, a pouch top seam is
27 being formed and sealed on a lower pouch. Also
28 preferably at this time the beak spout is being formed
29 on this lower pouch and a bottom seal on yet a further
30 lower pouch. This is the case since the film is in a
31 stationary position and for increased efficiency more
32 than one operation can be conducted on the film at this

1 top seam of an upper pouch and form the beak spout of
2 this upper pouch. This step can be carried out
3 concurrently with other sealing steps since the film is
4 in a stationary position. In this way, in this
5 form/fill sequence, three different sealing operations
6 can be conducted during each interval when there is a
7 pause in the movement of the film. The side seam is
8 sealed to form a tube, the top seal and spout are made
9 for a pouch for which the side seam has previously been
10 made, and the bottom closure seal is made on another
11 pouch which has just been filled with a substance.
12 After the top seal and beak spout of the upper pouch
13 and the bottom seal of the lower pouch have been
14 formed, the ultrasonic energy is stopped and the
15 pressure between the anvil and the ultrasonic horn is
16 increased to thereby sever the lower filled pouch from
17 the upper empty pouch. The lower filled pouch is then
18 forwarded for packing and the upper formed pouch is
19 filled. Also in the above sequence as the transverse
20 seals are being formed, the beak spout is being formed.

21 A persistent problem with regard to these pouch
22 containers is that of the contamination of the
23 transverse sealing areas at the time that the pouch is
24 being filled. This is a contamination by the contents
25 that are being flowed into the pouch. This is caused
26 by a splashing of the substance being flowed into the
27 pouch and a dripping of the product upon the
28 termination of the filling process. Since the inner
29 thermoplastic surfaces are to be bonded, one to the
30 other, excessive contamination can affect the integrity
31 of the transverse seals. However, since in ultrasonic
32 sealing it is the film juncture that is being heated,

1 of about 10KHz (kilohertz) to 70 KHz and most
2 preferably about 20 KHz to 40 KHz. Energy is supplied
3 to the ultrasonic horn through a booster 29.

4 The longitudinal sealing unit is designed for
5 sealing and need not be capable of also cutting film.
6 However, when it is desired that this unit also be used
7 for cutting, the anvil of the ultrasonic horn would
8 have a contact surface as shown in cross section in
9 Figure 3. The angle A of the surface 30 is from about
10 120° to 160° , and preferably about 150° to 175° . This
11 results broadly in an interior angle of 20° to 60° .
12 The top surface 23(a) is an edge and is sufficient to
13 produce an effective seal, but yet as the pressure
14 between the ultrasonic horn and the anvil is increased,
15 the film can be cut.

16 In Figure 4, there is shown the anvil assembly for
17 producing the top and bottom seals and the beak spout
18 for the pouch of Figure 1. This unit simultaneously
19 forms the bottom seal of a lower pouch and the top seal
20 and the seals around the beak spout of an adjacent
21 upper pouch. After these seals are formed, the
22 pressure between the ultrasonic horn and the anvil is
23 increased, and the thermoplastic material between the
24 bottom seal of one pouch and the top seal of another
25 pouch and the excess material in the area of the beak
26 spout is severed. This ultrasonic sealing unit must
27 have sufficient energy to complete the seal and to thin
28 the material for subsequent severing of the
29 thermoplastic film.

30
31
32

1 severing the film. The increased pressure is dependent
2 on the pressure that is utilised during the sealing
3 operations. The pressure can be increased by the anvil
4 being moved against the ultrasonic horn or the
5 ultrasonic horn being moved against the anvil.

6 In Figure 6 there is shown the complete transverse
7 ultrasonic sealing unit for forming the top and bottom
8 pouch seals and the beak spout seals. This consists of
9 essentially the anvil assembly 40 and the ultrasonic
10 horn 35. This unit produces the top and bottom seals
11 as well as the beak spout seals. This ultrasonic horn
12 consists of flat surfaces 36 to contact the shaped
13 surfaces 44 and 45 of the anvil. The ultrasonic energy
14 is transferred from the booster 37 to the horn.
15 However as noted above, the ultrasonic horn can be
16 shaped to function to sever the film rather than the
17 anvil being shaped to serve its purpose. Either the
18 ultrasonic horn or anvil must be shaped to provide for
19 a severing of the film after sealing. If the
20 ultrasonic horn is to function to sever the film, the
21 contact portion 36 of the ultrasonic horn must be of
22 the shape as is illustrated for the anvil. In such an
23 instance the anvil will have a flat surface.

24 As the pressure is increased on the film after the
25 film has been sealed the film will flow due to the
26 exerted pressure. This causes the film to sever at a
27 mid-point of the seal. Neither the horn nor anvil has
28 a sharp cutting surface rather they have dull edges.
29 The seal extends a very short distance beyond the horn
30 and anvil profile. The horn and anvil together both
31 seal and sever the film.

32

1 from the upper pouch which had a pouch top seal and
2 beak formed. The upper pouch is then filled. The
3 sequence is then repeated. The pouches are filled from
4 what is ultimately the lower end of the sequence.
5 Three pouches 68 are shown as being conveyed for
6 packaging. Two different pouches are being operated on
7 at 67 at one time. The upper pouch where the beak and
8 pouch top seal 14 is being formed, and the lower pouch
9 where the pouch bottom seal 13 is being formed.

10 In more detail the film 51 is unwound from a
11 supply roll 50. This passes down over a tension roller
12 52 and over directional rollers 53 and 54. The film
13 then passes over a roller 56 and downward to the
14 form/fill section. At 57, the film is formed into an
15 open tubular shape. Shaper 57 is supported by a fill
16 conduit 59 which receives a product to be packaged,
17 usually a liquid product from a supply conduit 58. The
18 fill conduit 59 is stationary and does not move (in a
19 modification described below in ^{Figures} ~~claims~~ 8 to 13 the
20 filling assembly moves so as to reduce any tendency to
21 splashing of the pouch surfaces before sealing). The
22 film passes in an open fashion by the supply conduit 58
23 to the seam forming and longitudinal sealing section
24 60. In this sealing section, a guide 61 directs the
25 film into a shape so that there is an overlapping
26 longitudinal seam for sealing by the longitudinal
27 ultrasonic sealing unit. The longitudinal ultrasonic
28 horn 63 receives ultrasonic energy from a transducer
29 62. The anvil is carried by the fill conduit 59. The
30 film, now in a tubular form, emerges from the
31 longitudinal sealing section 60 and is moved downwardly
32 by a controller 64. The controller 64 moves the film

1 transverse ultrasonic sealing unit 67. Also, while the
2 movement of the film (film flow) has stopped, the pouch
3 that has been formed is filled.

4 A preferred embodiment of filling conduit will now
5 be described with reference to Figures 8 to 13 as
6 mentioned above.

7 In Figure 8, the fill nozzle 110 is shown in a closed
8 position. In this position, no liquid can exit through
9 the opening 123 of the nozzle 110. The nozzle consists
10 of a body 114 which receives liquid through a channel
11 112 of a conduit 111. Liquid is received from a
12 conduit 136 through an opening 135. This conduit 111
13 also supports the nozzle and provides the means for
14 raising and lowering the nozzle during container
15 filling cycles. The conduit 111 threadedly engages the
16 nozzle body 114 by means of a thread 113. The conduit
17 115 in the nozzle body permits liquid to flow into the
18 valve stem housing 116 and to the area of the valve
19 seat 117 of the nozzle. The liquid passes around the
20 valve stem guide 126 of the valve stem 118 to the
21 region of the valve seat 117. The lower part of the
22 valve stem contacts the valve seat when the valve is in
23 the closed position. This will stop the flow of
24 liquid. When in an open position as shown in Figure 9,
25 the conduit 115 will communicate with the chamber 121
26 with liquid flowing from the conduit 115 into the
27 chamber 121. At the lower part of the chamber 121,
28 there are one or more screens 122 adapted to induce
29 laminar flow in the liquid that is being flowed. After
30 flowing through the screen the liquid will exit from
31 the nozzle through the aperture 123. Communicating
32 with the chamber 121 are one or more conduits 120 which

1 above the level of the liquid 131 in the container. In
2 Figure 13, the container 130 is shown to be full. The
3 nozzle is located above the level of the liquid and the
4 flow of liquid from the nozzle has ceased. At this
5 point, a suction is drawn on the conduits 120 so as to
6 remove excess liquid from the lower part of the nozzle,
7 ie, from the region of the screen or screens.

8 The primary functions of the screen or screens 122
9 are to impart a laminar flow to the liquid emerging
10 from the nozzle and to aid in preventing drip from the
11 nozzle when it is in a closed position. This screen
12 can be a single screen or a plurality of stacked
13 screens. It is preferred that a single screen be used
14 and that it have a thickness of about 0.1 mm
15 (millimetres) to 10 mm and preferably about 0.2 mm to 5
16 mm. The screen will have a mesh opening of about 0.1
17 to 5 mm, and preferably about 0.5 to 2.5 mm. This will
18 be sufficient to produce channels through which the
19 liquid will flow thus inducing an essentially laminar
20 flow.

21 It is also preferred that the nozzle be of a
22 diameter to essentially fill the cross-section of the
23 container during filling. For a pouch, this will be
24 about 60 to 90 per cent of the diameter of the
25 container. When the container is a jar, this will be
26 about 60 to 90 per cent of the neck opening of the jar.
27 A large diameter nozzle will produce less splashing
28 since the liquid will flow at a lower velocity. In
29 addition, the risk of highly turbulent flow is
30 minimised. In this way splashing and the contamination
31 of the inner walls of the container is reduced.

32

1 one or more screens of the nozzle into a recycle tank.
2 The suction is then terminated and nozzle is ready to
3 be lowered and another cycle commenced.

4 A prime objective of this filling nozzle is to
5 prevent the liquid that is being filled into pouches
6 and other containers from splashing up around the fill
7 nozzle and wetting the film in the area where a seal
8 will have to be made in a subsequent step. If the area
9 that is to comprise the seal has been wetted with
10 product, there is the potential for a weaker seal being
11 formed.

12 Essentially any film which can be welded by means
13 of ultrasonic energy can be utilised to form the
14 present pouches. The particular thermoplastic films
15 can be either amorphous or crystalline. Suitable films
16 include those of acrylic copolymers, cellulosic,
17 phenylene oxide, polycarbonate, and polystyrene.
18 Generally, crystalline resins are not as easily sealed
19 using ultrasonic techniques as amorphous resins.
20 Crystalline films are more rigid. Flexible films are
21 preferred. However, acetal resins, fluoropolymer
22 resins, nylon resins and polyester resins can be
23 utilised in ultrasonic sealing techniques. A preferred
24 film is one which contains at least one layer of
25 ethylene-vinyl acetate. The other layer or layers can
26 be polyolefin such as polyethylene, polypropylene,
27 polybutylene or polybutadiene.

28 The pouches which can be formed using the present
29 ultrasonic sealing techniques can be of essentially any
30 size. However, the preferred sizes range from about
31 50cc. to about 2 litres in size. These are the sizes
32 that are conveniently handled with regard to this type

1 portion of the tube as is a beak spout. This is formed
2 by a transverse ultrasonic horn and mobile anvil
3 assembly 67 (as shown in Figures 4 to 6). At the same
4 time that the top seal and beak spout are formed on
5 this pouch, a bottom seal is being formed in a lower
6 pouch which has been filled. An ultrasonic frequency
7 of 35 KHz is used to form these seals. The impinging
8 pressure of the transverse ultrasonic horn and anvil
9 assembly during sealing is about 40kg/sq cm. After the
10 side and top seals along with beak spout are formed on
11 the present pouch, the thus newly formed pouch with an
12 open bottom (at its top end) is filled with 250 cc of
13 bleach. The lower pouch 68, which has undergone
14 closure sealing, has been severed and is conveyed to
15 packing. The severing is accomplished by increasing
16 the impinging pressure of the ultrasonic horn against
17 the stationary fixture to about 90 kg/sq cm. No
18 ultrasonic energy is applied at this time. This then
19 completes a machine cycle. This cycle is then
20 repeated.

21 The sealed seams of a representative number of
22 pouches are tested in a pressure tester. The pressure
23 tester has a stationary and a movable platen. A sample
24 is placed between the platens and the pressure on the
25 pouch increased. A burst strength of greater than 150
26 kg indicates an acceptably filled pouch. The pouches
27 consistently exceed 150 kg.

28

29

EXAMPLE 2

30

31 The apparatus of Figures 1 to 7 is used in
32 combination with the apparatus of Figures 8 to 13 so

C L A I M S

1
2
3 1. A method of forming a shaped, sealed
4 flexible film pouch containing a liquid substance
5 comprising partially forming flexible film into a pouch
6 using ultrasonic energy, substantially filling said
7 partially formed pouch with the said liquid substance,
8 closing the said pouch by sealing the opening through
9 which the pouch has been filled using ultrasonic energy
10 applied by an ultrasonic horn to an anvil at a first
11 contact pressure, and increasing the contact pressure
12 to sever the film.

13
14 2. A method as claimed in Claim 1
15 comprising:

- 16
17 (a) shaping a flexible film into a tubular shape
18 with an overlapping edge;
19
20 (b) contacting the overlapping edge of the said
21 film in a tubular shape with ultrasonic
22 energy to bond the overlapping edge of the
23 said tubular shape to form a tube;
24
25 (c) sealing by ultrasonic energy a lower portion
26 of the said tube to form a first pouch;
27
28 (d) filling the said first pouch with a
29 substance; and
30
31
32

1 6. A method as claimed in any one of Claims
2 1 to 5 in which the said flexible film has at least one
3 ply that is bondable to itself by means of ultrasonic
4 energy.

5
6 7. A method as claimed in Claim 6 in which
7 the said flexible film has at least one polyene layer
8 and an ethylene-vinyl acetate layer.

9
10 8. A method as claimed in Claim 7 in which
11 the said polyene layer is selected from the group
12 consisting of polyethylene, polypropylene, polybutylene
13 and polybutadiene.

14
15 9. A method as claimed in any one of Claims
16 1 to 8 in which the said flexible film is fed as a
17 continuous sheet, formed into a continuous tubular
18 shape and sealed to form a continuous tube.

19
20 10. A method as claimed in any one of Claims
21 1 to 9 in which the said flexible film is in a
22 stationary position when the said upper portion and
23 lower portion are sealed and one pouch severed from
24 another pouch.

25
26 11. A method as claimed in any one of Claims
27 1 to 10 in which, in the sealing of the top seal to
28 form a pouch and a beak spout adjacent to the top seal,
29 the excess film in the area of the beak spout is
30 severed in a second step.

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- 1
2 (d) means to actuate the said first ultrasonic
3 horn and anvil assembly to seal the said
4 overlapping seam to form a tube;
5
6 (e) a second ultrasonic horn and anvil assembly
7 located subsequent to the said first
8 ultrasonic horn and anvil to form top and
9 bottom closures on the said tube and produce
10 a pouch;
11
12 (f) means to actuate the said second ultrasonic
13 horn and anvil assembly at a first contact
14 pressure to seal the said top and bottom
15 closures and at a second contact pressure to
16 sever the film that has been sealed to
17 separate a filled pouch from the said tube;
18 and
19
20 (g) filling means adapted to substantially fill
21 the said pouch subsequent to forming the said
22 bottom closure and prior to forming the said
23 top closure.
24

25 17. An apparatus as claimed in Claim 16
26 comprising means to produce a contact pressure between
27 the said first ultrasonic horn and stationary fixture
28 of about 10 kg/cm^2 to 70 kg/cm^2 .
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1 24. An ultrasonic horn and anvil assembly as
2 claimed in Claim 20 in which the said shaped contact
3 surface is essentially triangular in cross-section with
4 the base exterior angle being about 120° to 160° .

5
6 25. An ultrasonic horn and anvil assembly as
7 claimed in Claim 23 substantially as specifically
8 described herein with reference to Figures 2 and 3 or
9 4, 5 and 6 of the accompanying drawings.

10
11 26. Apparatus as claimed in any one of
12 Claims 16 to 22 in which the filling means incorporate
13 an anti-drip nozzle comprising an elongated tubular
14 member having an aperture therethrough for the flow of
15 a liquid, means at an upper end for the introduction of
16 a liquid and an outlet aperture provided with at least
17 one screen means across the aperture, and suction means
18 adapted to remove liquid from the said screen, and
19 means adapted to cause the said tubular member to be
20 raised during the filling of the container.

21
22 27. Apparatus as claimed in Claim 26 in
23 which the screen means are such as to induce laminar
24 flow and to decrease drip formation upon cessation of
25 flow of the said liquid.

26
27 28. Apparatus as claimed in Claim 26 or
28 Claim 27 in which the suction means are located in the
29 region adjacent to the said screen to remove excess
30 liquid from the said screen.

1 34. Apparatus as claimed in any one of
2 Claims 26 to 33 in which the body of the said valve
3 substantially fills the cross-section of the flexible
4 film package or the neck of the container which is
5 being filled.

6
7 35. Apparatus as claimed in Claim 30 or any
8 one of Claims 31 to 34 when dependent on Claim 30 in
9 which there is at least one suction means in the region
10 adjacent to the said screen to remove excess liquid
11 from the said screen.

12
13 36. A method as claimed in any one of Claims
14 1 to 12 further comprising:

15
16 (a) providing a tubular nozzle having a channel
17 therethrough, means at one end of the said
18 channel to attach the said valve to a source
19 of a liquid, and suction means on the other
20 end to prevent dripping upon the cessation of
21 input of liquid to the said tubular nozzle;

22
23 (b) as the container is being filled raising the
24 tubular nozzle so as to maintain the said
25 tubular nozzle above the surface of the
26 liquid in the container; and

27
28 (c) actuating the suction means upon the
29 cessation of the flow of liquid to the said
30 nozzle to remove excess liquid from the means
31 to prevent dripping on the other end of the
32 said tubular nozzle.

1 39. A method as claimed in Claims 36, 37 or
2 38 in which the said liquid is selected from the group
3 consisting of detergent, bleach, fabric softener and
4 lotions.
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Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

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